Operational Summary for Vegetation Management

Pinegrass Complex

Pinegrass Complex

This operational summary provides information about vegetation management in the pinegrass complex. This complex is dominated by almost pure stands of pinegrass (*Calamagrostis rubescens*). A second minor species in the complex is arctic lupen (*Lupinus arcticus*).

Topics covered in this summary include development of the complex and its interaction with crop trees; non-timber values and pre-harvest considerations; and management strategies for current and backlog sites.

Other Titles in this Series

Operational Summary for Vegetation Management:

- Dry Alder Complex
- Ericaceous Shrub Complex
- Fireweed Complex
- Mixed-shrub Complex
- Wet Alder Complex
- Willow Complex

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Operational Summary for Vegetation Management

Pinegrass Complex

Foreword

Managing competing vegetation during reforestation can be challenging. Combinations of plants that thrive in seral ecosystems are often well suited to dominating sites following harvesting or wildfire. While many treatment methods for limiting the growth and spread of these vegetation complexes have been explored, efficacy has varied widely. This is due in part to the widely varying mix of parameters from site to site, including the number, health and structure of the competing plants on site, site conditions and timing of forestry activities. In addition, while some treatments may provide suitable control, the cost in terms of site degradation, hazard to surrounding habitat or crop trees, or the cost of the treatment itself may be prohibitive.

Much work has been undertaken during the past decade by ecologists, silviculturists, and vegetation management specialists on identifying the characteristics of and the range of treatment options for major competing vegetation complexes. Until recently, however, knowledge about managing particularly challenging vegetation complexes was scattered. This series summarizes the key information needed to identify and manage important vegetation complexes in British Columbia.

Introduction

This operational summary provides information about vegetation management issues in the pinegrass complex. Topics include: complex development and interaction with crop trees; treatments that affect development of the complex; non-timber and pre-harvest considerations; and management strategies for current and backlog sites. Each complex includes several plant species and may be found over a wide range of ecosystems. As a result, response to treatments will vary within complexes, and prescriptions should be developed on a site-specific basis.

1. Description

Species Composition

Pinegrass (*Calamagrostis rubescens*) is the dominant species in this complex. A second minor species is arctic lupine (*Lupinus arcticus*).

Occurrence

This complex occurs on dry to fresh sites in the PP, IDF, and southern, drier ICH, MS, ESSF, and SBS zones. In the IDF and MS zones, the pinegrass complex is widespread and dominates the understory on a range of sites.

The pinegrass complex occurs on a wide range of soils, but most commonly on well-drained, loamy- to coarse-textured Luvisols and Brunisols. Soils vary from poor to very rich, and are commonly nitrogen deficient. These soils have at least a moderate moisture deficit during the growing season.

2. Development

Reproduction

Pinegrass regenerates mainly by vegetative means — through the lateral extension of creeping rhizomes.

Seedling establishment can occur following disturbances that expose mineral soil. While flowering is rare under forest canopies, plants on recently logged or burned areas produce abundant wind-dispersed seed. Seed germination is believed to occur whenever soil moisture is adequate (i.e., in spring or fall).

Rate of Development

Pinegrass persists in the forest understory and spreads rapidly following disturbances such as logging. Following clearcutting, dense stands can develop within 2–4 years. Lightly disturbed areas can be completely invaded after one season. Severely disturbed areas are usually invaded after 4–5 years.

Treatments that Affect Development

Treatments that increase light levels or create ground disturbance tend to favour pinegrass. They allow a continuous mat of pinegrass to develop from the loose open turf that occurs under forest stands.

Treatments that favour the development of the pinegrass complex include:

- openings created by natural disturbances, clearcutting, group selection logging, or partial canopy removal
- removal of other non-crop vegetation (e.g., deciduous trees and shrubs)
- ground disturbance during logging
- low- to medium-impact mechanical site preparation (MSP) and fires
- fertilization of conifers with nitrogen.

The pinegrass complex can be set back by:

- destroying shallow roots through high-impact fire or mechanical disturbance
- causing soil compaction by logging, MSP, or skid road construction
- seeding disturbed sites with domestic grass/legume mixes.

Interactions with Crop Trees

Pinegrass is a major competitor with conifer seedlings in the southern and central Interior, especially in the IDF. This competition is most pronounced on drought-prone sites where roots compete for moisture. Removing pinegrass reduces the moisture stress and increases soil temperatures early in the spring. Complete removal of pinegrass is more beneficial than partial removal. Also, seedlings that are established before pinegrass invasion survive better than seedlings established during or after pinegrass invasion.

Pinegrass provides several benefits to crop trees including:

- reducing soil surface erosion
- contributing organic matter to surface soil layers
- recycling nutrients that might otherwise be lost to leaching
- excluding more competitive species
- reducing or preventing overstocking of lodgepole pine.

3. Non-timber Values

Although cattle have low to medium preference for pinegrass in early summer and low preference in late summer, the abundance of this grass makes it extremely important for the Interior B.C. cattle industry.

Pinegrass provides important habitat for a range of small animals, birds, and insects, and forms the base of the food chain over a large area of the southern Interior. Pinegrass is also a valuable spring forage species for Rocky Mountain elk and mule deer.

4. Pre-harvest Considerations

Silvicultural System

If selection cuttings or thinnings in the IDF or in ponderosa pine stands are light, the abundance of pinegrass will increase relatively little because the newly available resources will be taken up by the trees. In addition, selection systems, which maintain an uneven-aged stand structure, are compatible with mule deer winter habitat requirements.

Stand density control may be used to meet integrated management objectives. For example, on sites where the priority is conifer production, a higher stand density should be maintained. On sites where forage production is a higher priority, a more open stand, which favours pinegrass, should be maintained.

Advance Regeneration

For advance regeneration, selection cutting can be used to release understory suppressed crop trees (e.g., Douglas-fir). Damage to advance regeneration should be minimized.

Method of Reforestation

The supply of lodgepole pine cones on site and the extent of pinegrass invasion should be assessed to determine whether natural regeneration could be effective. If natural regeneration is not an option, plantations should be established immediately, before pinegrass starts to invade the site.

Timing

Delays in site preparation treatments and subsequent planting often allows pinegrass to reinvade.

5. Vegetation Management Strategies for Current Sites

Site Preparation

General

Natural regeneration of Douglas-fir tends to perform poorly on both untreated and site-prepared pinegrass sites. Planting is recommended on these sites.

Site preparation can improve seedling survival by increasing the available soil moisture, increasing soil temperature in early spring, and decreasing the chance of frost damage (increasing nighttime minimum temperatures).

A strategy of combining a single-tree selection with periodic underburning can limit the understory vegetation and provide a suitable seedbed for conifer regeneration. Retaining the overhead cover will also reduce frost problems.

The most effective way to improve seedling survival and growth is to completely remove pinegrass from around the seedlings.

Mechanical

While low- to medium-impact mechanical disturbance can aggravate the pinegrass competition, intense MSP retards pinegrass growth and provides 3–4 years of control.

Dense pinegrass communities can increase the incidence and severity of summer radiation frost. Mechanical treatments should be used to reduce pinegrass cover on frost-prone sites.

Douglas-fir and lodgepole pine sites should be treated differently. For Douglas-fir sites, intense mechanical disturbance is recommended. The ripper plow or disc trencher can control pinegrass for 3–4 years and increase Douglas-fir survival and growth.

Patch scarifiers remove pinegrass and expose 50 × 100 cm patches of mineral soil. Patch scarifiers have produced noticeable improvements in survival and growth of Douglas-fir in the Cariboo Forest Region.

For lodgepole pine sites, only medium-impact MSP is necessary where natural regeneration is expected. Any MSP treatment that produces a continuous furrow (e.g., disc trencher, ripper, or ripper plow) is recommended for sites to be planted with lodgepole pine.

Patch scarification has improved lodgepole pine survival compared to unprepared sites. Severe disturbance should be avoided on clearcuts with abundant lodgepole pine cones to minimize pine overstocking. A moderate pinegrass cover can help prevent pine overstocking.

Screefing
Patch scarification by planters (30 × 30 cm patches) usually does not affect survival or growth of planted trees but favours pinegrass. However, deep scalping, which removes the root mat, may help.

Prescribed Fire
Low- to medium-impact burning can cause a rapid increase in pinegrass after one growing season and is, therefore, rarely used.

Chemical
Herbicides provide the best pinegrass control option, and may be the only effective treatment option on steep slopes, soils that compact easily, or other sites where machines cannot be used. On hot, dry sites, dead vegetation may act as an effective mulch, but may cause problems on frost-prone sites.

Glyphosate trials in various biogeoclimatic zones (including the IDFdk, MSxk, and ICHmk1) consistently indicate good control of pinegrass for 2–3 growing seasons. Several trials indicate that glyphosate controls pinegrass when applied in the growing season (May to June and later in August).

Limited research indicates that hexazinone effectively controls pinegrass but data are lacking on the length of control in B.C. forests.

Seeding
Seeding with domestic grasses following MSP can eliminate pinegrass. Since these domestic grasses can also be competitive, they may have to be grazed to minimize competition with crop trees.

Livestock Grazing
Cattle grazing can control pinegrass early in the growing season when the grass is palatable. However, the benefits of grazing tend to be short lived; several consecutive years of treatment provide better control than a single treatment.

Planting

Timing
Plantations should be established immediately after site preparation, prior to pinegrass regrowth.

Stock Type
Large, vigorous stock with a well-developed root system improves seedling survival on pinegrass sites. Also, bareroot stock appears to perform better than container stock on these sites.

Species Selection
Planting lodgepole pine or ponderosa pine rather than Douglas-fir on dry to very dry sites will enhance seedling survival.

Brushing

General
The need for brushing treatments will largely depend on the success of the site preparation treatment.

Manual
Clipping pinegrass in July to a height of 10 cm or less appears to provide the best control. However, the benefits of manually controlling pinegrass are generally outweighed by the time and effort required.

Chemical
Glyphosate effectively controls pinegrass but this treatment should be applied after conifer bud set.

Livestock Grazing
Timing of this treatment is critical to its success. Sheep browsing should not be carried out while conifers are flushing. However, the later the treatment occurs, the less pinegrass is palatable to sheep. Cattle will effectively graze the pinegrass early in the season. Grazing can be beneficial throughout the forest rotation to meet timber and range objectives.

6. Vegetation Management Strategies for Backlog Sites

General

Once a pinegrass complex becomes established, it undergoes little change over time. The complex is therefore similar on current and backlog sites, and the same vegetation management strategies can be applied to all sites.

7. Summary of Treatment Efficacy

Among the non-chemical treatments, severe mechanical and prescribed fire treatments are the most effective. However, they may negatively impact long-term productivity. Among the more moderate treatments, patch scarification and sheep grazing are partially effective.

Among the chemical treatments, broadcast application of glyphosate effectively controls pinegrass for 1–2 years. The impact of hexazinone is less known in B.C.

Low-impact MSP and broadcast burning treatments should not be considered as they encourage pinegrass invasion.

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Appendix – Key to Biogeoclimatic Zones of British Columbia

AT	Alpine Tundra	IDF	Interior Douglas-fir
BG	Bunchgrass	MH	Mountain Hemlock
BWBS	Boreal White and Black Spruce	MS	Montane Spruce
CDF	Coastal Douglas-fir	PP	Ponderosa Pine
CWH	Coastal Western Hemlock	SBPS	Sub-Boreal Pine–Spruce
ESSF	Engelmann Spruce–Subalpine Fir	SBS	Sub-Boreal Spruce
ICH	Interior Cedar–Hemlock	SWB	Spruce–Willow–Birch